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TREATMENT OF POTT'S PARALYSIS BY SUSPENSION, ETC.

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I have seen in the last ten years many cases of paralysis, the secondary results of angular curvature of the spine, and twice I have met with these palsies where there was tenderness over two or more vertebræ and local elevation of temperature *without* any visible curvature or projection.

It is hardly necessary here to dwell upon the causes of these palsies. They are due to inflammatory thickening of the membranes, causing pressure, which leads to myelitis and local atrophic destruction in the areas so compressed.

More rarely—very rarely—the whole bony spinal structure is so damaged as through its collapse to lead to pinching of the cord. In either case there may be, finally, degenerative changes in the cord below the portion diseased by pressure. Owing to the fact that the front of the spine suffers most, motion is primarily impaired, and sensation slightly, or not at all, or only much later in the case. Excessive reflexes early announce the interruption of nerve paths and the presence of irritative changes, and only cease to exist if (as is usual) degenerative alterations affect the regions below the seat of carious disease. Finally, sloughs may occur, and death from exhaustion.

In other cases to be found in every abode of incurables, the palsy, in whatever degree it be present, is a thing for life, and by no means the finally curable matter which many assume it to be. The common history of mild cases is one of motor loss with only more or less numbness, and the usual excess of reflex activity.

For many years of my life, carried away by modern authority and example, I put all cases of Pott's paralysis at rest, used tonics and oil, and cauterized the back. In most instances this method answers. It is slow, but it suffices. The spinal curve left to itself solidifies—the palsy fades away. The treatment is wearisome and confining, but at last the patient gets up and puts on a brace.

After some years I met with two cases in succession which did not get well at all, and, about this time, I found one or two children who were sure to die of tubercle if left in bed. In despair I fell back upon the treatment by suspension advocated by my father, Prof. J. K. Mitchell, in 1826.[1]

As soon as I began again to use this simple means, I saw that it was admirably effective. It lets the patient get out of bed; it distinctly alters the pathological curve of the spine; it gives ease and relief to aches; it seems to act with more speed than other plans, and, when these have failed, it gives a new resource.

For the orthopædist of to-day the back is to be splinted. The conditions in Pott's disease are likened by him to those of a fracture; but if compared to any, it should be to one of the thigh where the muscles are continually pulling at the fragments. The problem is this: If we draw upon the bent spine of caries, so as slowly to alter its curve, will the gap we create be filled up by tissue firm enough for support? It seems to be so. So much for the mechanical part of the question. It is needless to go further as to a matter settled by numberless cases.

When, in addition, we come to ask how extension acts upon the spinal cord, and the inflammatory products which compress it, the question is more puzzling. Why is it that pulling at the curve, in some way before we much alter that curve mechanically, and often in a few days, so changes the conditions *within* the canal as to allow sensory impressions to pass the seat of stricture?

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[1] Amer. Journ. Med. and Surg., Jan. 1826. Some of the earlier surgeons, as Glisson, used suspension from the head, even adding weights to the legs. Darwin, the author of "Zoönomia" (1801, p. 140), proposed extension by crutch supporters set on the arms of a chair with *occasional* aid by suspension from the head. He seems to have preferred suspension in bed on an inclined plane. M. Le Vacher, whom he quotes, in 1768 used suspension by the head, the weight being borne from the hips. Shaw (London, 1827, p. 98) treated his cases by the inclined plane. The cut in which he figures a suspension by the head (p. 107) refers to the use of a jacket (p. 32) as a support for the head-stay. Bamfield also seems to have used suspension, or mere sustentation, kept up from a jacket supported on the pelvis. Sheldrake's curious book (1798, p. 20, *et seq.*) figures a pelvic support for a head-suspending iron. Most of the attempts to suspend either used a jacket as a point of support, or employed the inclined plane. No reasonable systematic suspension slowly increased, or combined with a chance to move about, preceded the date of my father's paper of January, 1826. Pott's papers bear the title of "Essays on Palsy of the Lower Limbs," and his account of this spastic paralysis has the distinctness of a master hand He speaks with some scorn of all machinery, and, as we all know, relied on issues, setons, and the like. Of late years Benjamin Lee, in an able paper, has recalled attention to the results and methods of J. K. Mitchell.

If the spinal cord, in place of hanging in normal suspension in the canal, is in these cases of caries bound fast and anchored, so to speak, it seems probable that any serious extensive force exerted on the angulated column of bones must more or less pull upon and disturb the binding masses of inflammatory deposit. I believe, however, that there is something more than this involved, and that the pull made on the whole length of the bony column, even when no meningeal inflammation is present, may, in some way, alteratively affect both cord and membranes through stretching of the cord and alteration of vascular conditions. With this idea I have twice used suspension in cases of spastic paralysis in which there was no caries. Both proved failures. Meanwhile, in Russia and France (if we may trust a statement in the *Progrès Médical* of January 19, 1889) this means has had a brilliant victory in a fair share of cases of posterior sclerosis. I am now experimenting with it in this disease. I have no intention of entering fully on the general question of the therapeutic management of spinal curves caused by disease. I believe that, with rare exceptions, all cases of deformity of spine from caries are best treated by early use of suspension, in conjunction with other means; but my present object is to show that Pott's palsy (as it was called) is also best dealt with by this plan.

As to the methods to be employed, something must be said. When in 1826 my father used suspension, he devised a number of ways of applying it so as to allow the child (for it was the young of whom chiefly he speaks) to sit up, to move in a spine-car on rollers, to ride a hobby-horse, or to sit in a swing. A curved iron, made movable and set by a screw, sustained the head-sling in which the head was held by the chin and occiput. His plan was cautious, and even deliberately slow, and as to it I leave the following quotation to speak:

> "I have usually made very little extension for the first week; but have, thereafter, elevated the rod from one-eighth to one-fourth of an inch weekly, in proportion to the yielding of the spine. The progress of the reduction of the curve is, of course, more rapid at first; but as the curve is lessened, the mechanical advantage of the suspensory apparatus is equally diminished; and its effect is also resisted when that degree of curvature is removed which depended exclusively on causes having no relation to change of structure. But when a remnant of deformity is kept up by a change in the form of the vertebræ, and their *intermedium*, the operation of the remedies must be tedious as was the disease during its formation. When there is caries, we must wait for the production of new bone to support the wasted column; and when there is, without caries, a wedge-like condition of the vertebræ, we must rest on the slow, but certain, processes of absorption and deposition for a final cure. If undue pressure on one side of the column produces the deformity, the removal of the pressure to the other side must ultimately correct the distortion.
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> "For the fulfilment of the second indication nothing more seems necessary than to use the means suggested for the first. Cases *may* occur, of so violent and intractable nature as to demand continual support. Such must be kept, during the whole period of treatment, in one or other of the many instruments designed for the suspension of the head, and which at the same time interfere not with either general or partial exercise.

> "It is not necessary to exceed four hours a day of suspension, but patients often like the application of extension to last longer, and they pass six hours or more in the head-slings."

All of the means alluded to I have employed, but in adults and in the wards of the Infirmary for Nervous Diseases, we make use in many cases of a cross-bar placed over a bed or a chair, and from this suspend the patient. A good plan for the chair suspension is to use a low seat on which are placed a dozen or less of thin one-eighth or one-quarter inch pieces of board. By removing one of these from time to time systematic extension is obtained.

My father usually proceeded, as has been seen, by cautious degrees. I, however, have been accustomed, especially in the young, or in young adults, to make at first a strong pull on the spine by suspension, and to leave the patient's sensations to govern the amount endurable. In younger people I follow my father's rule of very gradual increase in the amount of pull made by suspension. As it has become interesting to know how much pull on the bent spine is well borne, I have lately put a little steel spring balance in the suspension apparatus, with these results as to endurance. Many of these diseased people bear the pull of twenty to seventy pounds for four to six hours a day. The pain, the sense of gain, the fatigue, are good guides for us. A great variety of suspensory means may be used according to the site of the trouble, but it is so far clear to me that suspension by the head, partial or complete, aided or unaided, should be employed in every case where palsy is one of the results of the caries.

In cases of spinal maladies, to get the alterative of complete suspension, the plan of Matchoukowsky may be followed, or the plaster jacket used with or without additional pull on the head.

It is interesting to watch a case of Pott's palsy subjected to partial suspension treatment. The patient becomes more and more at ease, and, if in a wheel-chair, can move to and fro while suspended. In ordinary cases, where the vertebræ have not become reconsolidated in their new position, and where there is only a relative degree of motor palsy, the change, as I have said, is often so sudden as to excite surprise. In older or worse cases, where sensation has suffered, or where the third degree has arrived—that is, degenerative change below the curve—in all of these we must look for very slow gains, and welcome them first in the return of sensation, and then of the reflexes, from below upward.

Since writing this brief paper, I have read an editorial in *The Medical News* relative to Dr. Wood's method of making suspensions for the treatment of Pott's disease. It seems to me reasonable for cases of lower dorsal curvature alone, and I think it might be more so, if, while lifting from the jacket, a portion of the pull was made, also, directly through the head. I, myself, have never found anybody who would not bear this partial suspension from the head alone and for hours. The pull it makes from the head is a very direct one upon the spinal column; the pull made by Dr. Wood's jacket must distribute itself over considerable space, and much of it must fail to influence the spine. Thus in his method the amount of pull which really acts on the spine is impossible to determine, and must depend to a considerable extent upon the situation of the carious vertebræ.

I shall certainly in the future suspend with both head and jacket in lower and in even mid-dorsal curves, and I am now using the jacket in a case of extension for ataxia. In cervical caries extension from the head is imperative. In old consolidated spines with palsy not due to bony pinching of the cord, I would use both means of suspension, and daily prolong the amount of this treatment. In very bad early cases with abscesses, I should desire to use extension, at first, by the milder method of the inclined plane. As to the medical treatment of Pott's disease, it is needless to speak; we all agree as to that; and, of course, in every case of palsy electricity should be used to keep up the muscular nutrition. This may be aided by passive motions and mild effleurage of the skin; and, later, by deep kneading, never to last very long. Neither does suspension exclude the use of frequent cauterization, for which Charcot claims so much. I may add that I have seen suspension succeed where frequent use of the hot iron had failed. It is interesting to find that my father, who had twice been in the East, recommends shampooing, percussion, and friction for the children under treatment. It remains to defend my position by relation of cases, and I shall as to this limit myself to the narration of three cases, but I shall also quote others from my father's essay.

This present paper does not pretend to bring forward any novelty; but, as I find neurologists all adhering to methods of treating the palsies of Pott's disease which appear to me ineffective or irrational, I have ventured to set forth anew a treatment which had so large a success in my father's hands, and has now again had it in mine.[1]

The following cases from his paper I quote, because his essay is not easily to be had, and because of the brilliant results he relates in cases of caries in various parts of the spine, and in instances of paraplegia following Pott's disease.

"I have seen no case of *posterior* curvature which did not cease to cause pain so soon as it was subjected to the action of the spine-cart. Irritation ceased, the tenderness of the part departed, and where the legs were affected they recovered their ordinary powers. In fine, to all appearances, there ensued a complete arrest of the diseased processes. The recent writers object decidedly to the use of suspension in carious cases, on the supposition that there exists considerable danger of fracturing the spine at the diseased part, even after ankylosis has supervened. After the occurrence of ankylosis there can be no good reason for using my instruments, unless the disease should extend itself further.[1] Where there is advantage to be derived from extension, I would use them, without much regard to such theoretical objections, because the objectors are not able to produce a single instance of such an accident arising from mechanical extension.[2]

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[1] Gowers speaks of suspension as possibly advisable, especially in children, where other means have failed, where it is said to have been followed by instant improvement. He gives no authority.

"To demonstrate more clearly the utility of the plan of treatment proposed in this paper, I beg leave to describe a few cases.

"On the 1st of February, 1842, I was invited by an eminent physician to see with him a case of curved spine. A. S., a boy, about five years of age, was the subject of this disease. At that time his occiput rested on the *vertebra prominens* so as to prevent any portion of the neck from being visible from behind. The pressure of the head upon the space between the shoulders had caused painful excoriations. In endeavoring to cleanse the back of the neck, it was necessary to insert a wetted cloth edgewise, as any attempt to introduce a finger gave considerable pain. Besides this posterior curvature which formed a very acute angle about the uppermost dorsal vertebra, there existed the serpentine or lateral curvature so well described by Dr. Shaw. This curvature was convex toward the right shoulder above, and convex toward the left hip below, a direction of lateral curvature from which it seldom, if ever, deviates. At the angle caused by the *posterior* curvature the patient felt, at times, severe pain, particularly when in motion. Indeed, so painful was a rotary motion, especially in bed, that he found it necessary to call for the assistance of an attendant when desirous of changing his position. During the greater part of the day he sought refuge from pain in bed, or in the arms of his mother or his nurse. His pulse was rapid, without force or regularity. Exacerbation of febrile symptoms in the afternoon, and colliquative sweats during the night, afforded proof of a hectic state of his system. His appetite was irregular, his tongue encrusted with a moist, russet-colored substance, and his breath very fetid. His bowels were usually costive, but sometimes relaxed. At times he complained of severe pain in the epigastric region. His skin was, during the day, dry and rough, and was covered with bran-like spots, as if the cuticle was separated from it in scales. For a few days before the consultation, the child had lost in great measure the power of deglutition. The water which he endeavored to swallow generally escaped from the angle of his mouth.

"The remedies used during the previous treatment of his case were, laxatives occasionally, and afterward the chalybeates, and some other tonic medicines. The child, before it became too feeble to endure exercise, had been directed to swing by grasping a suspended bar of wood and supporting its body by means of its hands and arms. The exercise was found to be too violent, and could not be endured long enough to produce beneficial results.

"In consultation, February 29th, we resolved to try the effect of such suspension as would relieve the patient of a portion of his weight, and at the same time permit him to take exercise.

"The mechanical deformity was treated by the chair with rockers and the spine-cart. After a short time the child refused to sit in the chair, but continued to use the cart four or five times a day. From the moment at which these means were applied there was exhibited a general amelioration of all these symptoms. The curve became less and less conspicuous—that which was lateral entirely disappeared—and there now remained of the angular projection only enough to show where the disease had been seated.

"On the 2d of June I deemed professional attendance no longer necessary, and to this day[3] the child remains robust, active, and cheerful, without deformity which would be observed by those who had not been acquainted with the previous history of the case.

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[1] This is not the case however in curvature with paralysis. The curve may be old and unchangeable, but, nevertheless, the palsy will get well after use of suspension.—S. W. M.

[2] North American Medical and Surgical Journal, January, 1826, Dr. J. K. Mitchell

[3] He is still alive and well.—S. W. M.

"Several other cases resembling the above in the angular and lateral curve, the impaired digestion, and roughened skin, have been treated with equal success. One of them, the case of E. F., fell into my hands on the 4th of September of the present year. The patient is, at the date of this paper, December of the same year, in good health, and rather more than two inches taller, in consequence of this straightening of the curve.

"One of the most difficult and intractable cases I have yet encountered was that of E. C., a girl, four years old. This child had a posterior curvature, seated nearly in the middle of the back, and a serpentine curve so great as to cause the lower limbs to repose on the crest of the os ilii of the right side. The projection of the shoulder and hip was such as to excite the notice and sympathy of every one. The child remained about four hours a day in the spine-cart, and was left at liberty during the remainder of the time. At present the dorsal prominence is small and apparently diminishing; and although the child still exhibits some lateral curvature *when it is off its guard*, it is able to carry itself, when it chooses, nearly in an upright manner. While *in* the spine-cart no curvature of this kind is perceptible.

"James H., a boy, aged about seven years, was brought to me in May, 1824. He had evidently a disease of the middle dorsal vertebræ, by which the bodies of two, at least, of the bones appeared to be affected. A shuffling gait, observed about six weeks before, led to the examination of the case, and a physician at New Castle discovered the curvature. In this case one of our most eminent physicians advised issues; but as the mother was predetermined not to use that mode of treatment, the child was brought to me to be placed in a spine-cart. One was accordingly obtained, but was not used regularly, because of the unwillingness of the boy to submit to any restraint. The progress of the complaint was rapid, notwithstanding the use of purges, baths, etc. At length the lower limbs began to fail in their office, and the poor boy was compelled very frequently to throw himself, for ease, on his face on the floor. When he ascended the stairs he was obliged to go on all fours. At this time he expressed greater willingness to endure the restraints of a machine, because he found himself more comfortable when in one. In a few days, strength and facility of movement returned, and since that period no increase of curvature has been perceived. His general health is now good, and he has a remarkably robust appearance. It may, in this place, be proper to remark that in every case, except one, in which these machines have been applied, either to posterior or lateral curves, the tone and vigor of the system have been immediately restored, and the pain and tenderness of the part concerned have disappeared."

The following cases are my own.

One, as yet incomplete, is interesting for various reasons. I merely give, at present, a summary of its notable facts.

Mr. T., aged thirty-six years, angular curve in mid-dorsal region.

Two years ago he first noticed paralysis of motion, in March, 1888. Sensation suffered some months later in both hands, and had been entirely lost for five months in November, 1888. There was also complete loss of reflexes below the navel. There were, also, rectal feebleness and vesical palsy. There was erythema of nates, but no sloughs. He had been ably treated by the usual means—rest, cautery, etc. His general state was good. Suspension was used in December, and gradually increased to two or three to four hours a day, and the pull from twenty to sixty-five pounds. In two weeks there was partial return of sensation, which slowly improved. There was also return of clonus. In five weeks there was very slight return of the power to move the second and third toes of the left foot. Since then there is very slow increase of sensation, which varies daily, as does the growing power to move the toes.

Of the future of this case I cannot speak confidently. It shows certainly the influence of extension on a spine already considerably consolidated, and I mention it here as being one of the worst I have ever tried to handle.

C. C., aged twelve years, of apparently healthy family, without tubercular history on either side.

In March, three years before I saw him, he began to complain of pain in his back, where, on examination over the middle dorsal region, there was found a slight projection. The parents of the boy being in the lower ranks of life, little attention was paid to his complaints, but, after six months, the curvature of the spine and the increasing amount of pain rendered it necessary for a physician to be seen. Under the advice of this gentleman, the child was given an ordinary spinal brace, which, however, did not appear to answer any better purpose than that of irritation. At this time there was more or less fever in the evenings, and a great deal of pain running round the flanks from the seat of the disease.

Late in the year there was more or less numbness in both extremities. In the fall the patient was placed in bed, where he remained all the winter; in fact, most of the time since, up to the date of my attendance—that is to say, for two and one-half years. During this long repose the curvature of the spine increased, the pain grew greater, and the limbs became numb. The patient was completely insensible to touch or to pain, and very soon after there arose, also, an increasing difficulty in motion.

When first I saw the lad, two years and a half from the period at which the disease began, this was his condition: The disease seemed to have followed the ordinary course of spinal-pressure paralysis: First, pain, loss of sensation in all of its kinds, then difficulty in motion, and, finally, loss of motility.

The reflex excitability went, however, far beyond the ordinary expression. A light blow with a percussion hammer on the shin caused the leg to fly up a foot or two from the bed. When six months later I saw him again, there was a marked degree of degenerative change in the muscles below the waist, and there was neither sensation, motion, nor reflexes. Water accumulated in the bladder, and had to be drawn off from time to time. The condition of the rectum was such that the feces had to be dug out, and the state of the child was most pitiable. The only thing which he lacked to complete the misery of this picture was the presence of sloughs, such as existed in one other case to which I shall call your attention.

So far as treatment is concerned, he had had cauterization, long rest in bed, with efforts to extend him while there, and a plaster jacket, which, so far as I could learn, had been very well put on. None of these means had done more than to make him comfortable by the relief from pain.

It was evident that in this case there had been pressure from hypertrophic thickening of the dura, since the curve was not sharp enough to have punched the cord. But, also, it was clear that there had been a degenerative change below the pressure point, because the reflexes had entirely disappeared, and because the muscular responses to a blow were feeble or absent. Certainly, there was little to encourage treatment.

I directed the parents of this boy to have made a wooden support from which was hung a cord, to which was attached an iron arrangement according to the figures in my father's paper of 1826. It was found, after two or three days, when the child was sitting under this support with his head lifted and fully extended, that the pain did not trouble him, although he had never before been free from pain when sitting upright since he was attacked by the disease. This fact made him very willing to undergo the discipline necessary, and his parents were enabled in a few days to increase the amount of suspension to two hours morning and evening. No attempt was made to measure the suspensory pull, of which, however, I shall presently speak in regard to another case. The amount of lift exerted by this little apparatus was simply that which was comfortable, and never went so far as the whole weight of the body. The result was most striking. Within ten days after the suspension began there was a considerable return of active pain in the legs, together with the positive sense of touch over a large part of the limbs. Three days later he could tell which toe was touched, and he had generally good locality impressions as to touch within two or three inches of the place selected for trial. The pain sense came back nearly at the same time, and it then seemed to me to be extraordinarily acute.

At this period, also, there arose certain alterations in the nutritive state of the limb. This seemed decidedly apparent to his parents and friends. The skin became less dry. The brawn-like hardness which I had seen about his ankles passed away very rapidly, and the general rigidity of the muscles lessened. It was fully a month after the suspension began before he recovered any power over his bladder. The return of capacity to empty the rectum was much slower; it had to be stimulated by electrical treatment. Thirty or forty days after the suspension began, motion could be made in the right great toe; from this motility spread over the whole right limb and then began in the left.

It is hardly necessary to trace this case further; it is only needful to say that there was gradual return of all the functions, so that, at the end of four months, I was willing to permit the lad to get upon crutches and to wear a plaster jacket, but for fully eight months he passed a certain length of time in the suspensory chair, or in a spinal car, somewhat similar in appearance to the one described in my father's paper.

This lad made a fair recovery—that is to say, there is now no loss of sensation in the limbs—and he is able to walk about with the aid of a stick. He is capable of earning his own living.

A. B. C., a physician, aged thirty-two, and unmarried. He comes of a family noted for health and long life; free from scrofulous or tubercular disease, and without history of cancer nearer than four generations.

Previous to 1883 the patient's health was excellent. Aside from the slight ailments of childhood he had been perfectly healthy; never had venereal disease. In July, 1883, while playing football, he fell, striking hard upon the back, others falling upon him. Notwithstanding the severe concussion, he was able, in a few minutes, to walk home, and recovery from the immediate effects of the accident took place quickly.

An urgent country practice called this gentleman out upon long drives over rough roads, and, after some weeks, pain was felt in the right flank. This was occasioned by severe exertion or sudden jolt. No attention was paid to this at first; but the pain increased in severity and constancy until November, 1883, when driving had to be given up. The pain was confined to the right side, and was not felt in the back. There was no prominence of any vertebræ; no weakness of the limbs. Meanwhile the general health was good.

The use of the actual cautery once a week, and small doses of iodide of potash, colchicum, and guaiacum gave no relief; on the contrary, the pain and soreness grew worse, extending to the back.

In January, 1884, weakness of the lower limbs was noticed. This came on when walking up hill or walking fast. The patient's legs began to twitch and jerk, and he had a tonic spasm of the muscles of the legs on awakening in the morning. The knee-jerk was exaggerated at this time and so remained.

In March, 1884, a prominence of one of the vertebræ was observed, and the diagnosis of Pott's disease was made. A plaster-of-Paris jacket, the actual cautery, the bichloride of mercury, iodides, and tincture of iron were used without avail, and in one month paraplegia was complete. Sensation was also abolished. The sphincters were powerless; the urine became alkaline and loaded with phosphates; priapism was present occasionally. The legs were jerked about in almost constant spasms. The feet, when at liberty, were drawn up to the body, and had to be tied fast to the bed. The legs were greatly wasted. Soreness in the back and sides continued to be severe, and for only a few minutes at a time could the patient sit up in bed.

One year later, in very much the same condition, but with sloughs of the nates, he came under my care at the Infirmary for Nervous Diseases.

The treatment adopted was at first the prone position and application of bags of ice to the spine. After ten days, hot water and ice were applied alternately to the spine four times daily for about half an hour each time. The bed-sores were treated with ice and hot water and easily healed. At the end of five weeks of this treatment the first changes were noticed. The spasms in the legs diminished somewhat. Sensation was still absent; but in the third week of treatment, at first touch, and then pain and temperature sense began to be slightly noticed in the legs above the ankles. The sensory changes were trivial, and, after five weeks in the infirmary without increase of betterment, the patient was sent home, and a plan of treatment adopted to which his cure is due.

Two weeks after his arrival at home (there having been no further change under ice and heat) a system of spinal extension was used. To the back of a wheel-chair was attached a steel shaft, curved so that it extended over the head. A head-piece, similar to that used in extending patients in applying plaster-jackets, was attached to this shaft. At first only a moderate pull was made, as it was somewhat uncomfortable, causing slight pain at the curve of the back and sides, and in the neck. But the patient soon became used to it, and was finally, at times, suspended by the whole weight of the body—120 pounds. No injury was done by this.

The back of the chair in which the patient sat was elevated many times a day, so that he was in a sitting position with a steady extension of the spine. Care was always taken that the back of the chair was lowered to a reclining position before the head-piece was taken off. On going back to bed the head-piece was attached to a pully over the bed, and thorough extension was used before lying down.

Hot water and ice were used every day, and faradic electricity to the paralyzed muscles. Improvement came by degrees and sensation improved continuously. In three months the patient could move one toe a very little; in a few months he could stand, and in a year he could walk about. As motion improved, power over the sphincter returned to full strength. Sexual power had been lost, but now was restored. As motor gain took place sensation also improved, and is now normal. The muscular spasms which had characterized the case gradually lessened, and their lessening gave some of the first gleams of hope in this dark experience.

The patient writes that he is still gaining strength and gradually resuming his accustomed work. Suspension has been given up by degrees; but still, if the back aches after being long afoot, he uses suspension for a little while as a relief. A spinal brace put on nearly a year ago, is still worn for ease and support.

The curve at the seat of the disease in the spinal column is considerably less than it was to begin with; the knee-jerk is still excessive—six and a half inches of foot leap, and there is slight ankle-clonus, equal on both sides. However, as the man can walk several miles, is practising his profession without pain, with all his bodily functions restored, I look upon his cure as one of the greatest triumphs it has been my fortune to witness.

My conclusions are that suspension should be used early in Pott's disease.

That used with care, it enables us slowly to lessen the curve.

That in these cases there must be in some form a replacement of the crumbled tissues.

That unless there is great loss of power, the use of the spine-car or chair, etc., of John K. Mitchell, enables suspension, especially in children, to be combined with some exercise.

That no case of Pott's paralysis ought to be considered desperate without its trial.

That suspension has succeeded after failures of other accepted methods.

That the pull probably acts more or less directly on the cord itself, *and that the gain is not explicable merely by obvious effects on the angular bony curve.*

That the now well-known influence of extension in Pott's palsy makes it probable that in other forms of spinal disease, not due to caries, extension in various forms may be of value, as has apparently been of late made clear.

That the methods of extension to be used in these and in carious cases may be very various, only provided we get active extension.

That the plan and the length of time of extension must be made to conform to the needs, endurance, and sensation of the individual cases.